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Mark S. Young

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EXAMINER

LOONAN, ERIC T

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/738,003	<b>Applicant(s)</b> YOUNG, MARK S.	
	<b>Examiner</b> ERIC LOONAN	<b>Art Unit</b> 2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2007 and 10 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8,12 and 14-20 is/are rejected.
- 7) ☒ Claim(s) 9-11 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is based on application 09/738,003 originally filed 14 December 2000. **Claims 1-2** and **4-20** are currently pending and have been considered below.

#### ***Claim Objections***

1. **Claim 1** is objected to because of the following informalities: Insufficient antecedent basis for the limitation "the type of data" as stated in Line 9. The Examiner suggests for the limitation to be amended to state "a type of data". Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 19 and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by Shibuya (US Patent 6,185,647).

4. **Claim 19:** A method for data transfer arbitration comprising: monitoring volume of data in data transfers for a plurality of devices (Col 4, Lines 10-14); and assigning a priority to each device corresponding to the volume of data in data transfers generated by the device (Col 4, Lines 14-18).

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5. **Claim 20:** An apparatus for data transfer arbitration comprising: means for monitoring volume of data in data transfers for a plurality of devices (Col 4, Lines 10-14); and means for assigning a priority to each device corresponding to the volume of data in data transfers generated by the device (Col 4, Lines 14-18).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. **Claims 1, 2, 4, 7, 12, and 14-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibuya in further view of Hill et al (US Patent 6,449,090) hereinafter known as Hill.

9. Shibuya discloses:

- a. **Claim 1:** An apparatus comprising: a memory (Fig 5, 10); a plurality of functional units (Fig 5, 22-1 through 22-4) that transfer data to and from the

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memory; a crossbar (Fig 5, 46) that provides a data path from each unit to the memory, wherein the crossbar comprises an arbitration unit (Fig 5, 48) to monitor data traffic generated by each of the plurality of functional units through the crossbar and assigns a priority to each functional unit based on the data traffic (Col 7, Lines 12-20).

b. **Claim 2:** The apparatus defined in claim 1, wherein the arbitration unit monitors data traffic from each functional unit by monitoring how often each functional unit transfers data through the crossbar (Col 7, Lines 12-20).

c. **Claim 4:** The apparatus defined in claim 1, wherein the arbitration unit uses a programmable priority scheme (Col 7, Lines 12-20) and a fixed priority scheme (Col 5, Lines 33-36; 'Mode 0').

d. **Claim 7:** The apparatus defined in claim 4 wherein the arbitration unit uses a number of rotating slots, each programmed to assign priority to any one of the plurality of functional units (Fig 5, 20-1 through 20-4).

e. **Claim 12:** The apparatus defined in claim 1 further comprising: a central processing unit (CPU) (Fig 5, 10); and an access bus coupled to the CPU and plurality of functional units (Fig 5, 16), the access bus being independent of the data path ("Official notice" has been taken in the Office Action mailed 24 March 2003 that 'split busses' were known prior to the time of filing, and a person of ordinary skill in the art would have found it obvious to modify the Shibuya/Hill combination so as to use a split bus for the purpose of maximizing bus utilization given that systems utilizing a split bus allow for bus pipelining).

- f. **Claim 14:** The apparatus defined in claim 1 wherein the arbitration unit further comprises a direct memory access (DMA) port request unit that allows access priorities to the memory to be programmably defined (Fig 5, 25).
  - g. **Claim 15:** The apparatus defined in claim 1 wherein the arbitration unit further comprises statistics registers that indicate usage of the data paths (Col 2, Lines 10-16).
  - h. **Claim 16:** The apparatus defined in claim 15 wherein the statistics registers store a count of the number of data transfers through the crossbar (Col 2, Lines 10-16).
  - i. **Claim 17:** The apparatus defined in claim 15 wherein the arbitration unit dynamically adjusts the priority assigned to each functional unit based on bandwidth demand requests by each functional unit (Col 8, Lines 60-67).
10. In **Claim 1**, Shibuya does not appear to explicitly disclose an arbitration unit that monitors the type of data that each functional unit transfers.
11. However, Hill discloses **Claim 1**'s arbitration unit that monitors the type of data that each functional unit transfers (abstract).
12. Shibuya and Hill are analogous art because they are from the same field of endeavor of prioritizing bus requests.
13. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Shibuya and Hill before him or her, to modify the arbitration unit policy of Shibuya to include data type monitoring as taught by Hill.

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14. A motivation for doing so would have been to improve system performance when handling prefetch requests (Col 1, Lines 27-45).

15. Therefore, it would have been obvious to combine Shibuya with Hill to obtain the invention as specified in the instant claims.

16. **Claims 5, 6, and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibuya (US Patent 6,185,647) and Hill in view of and Fischer et al (US Patent 6,513,082) hereinafter known as Fischer.

17. In **Claims 5, 6, and 8**, Shibuya and Hill disclose the limitations of parent Claims 4 and 7.

18. In **Claims 5, 6, and 8**, Shibuya and Hill do not appear to explicitly disclose:

j. . **Claim 5:** An apparatus wherein the fixed priority scheme comprises a round robin scheme that rotates the top priority designation among at least some of the plurality of units.

k. **Claim 6:** An apparatus wherein the programmable priority scheme makes changes based on actual traffic statistics.

l. **Claim 8:** An apparatus wherein the arbitration unit grants access to one functional unit if the one functional unit makes a request while the arbitration unit indicates that the one functional unit is at one of the number of rotating slots having a highest priority.

19. However, Fischer discloses:

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- m. **Claim 5:** The apparatus defined in claim 4 wherein the fixed priority scheme comprises a round robin scheme that rotates the top priority designation among at least some of the plurality of units (Col 8, Lines 39-41).
  - n. **Claim 6:** The apparatus defined in claim 4 wherein the programmable priority scheme makes changes based on actual traffic statistics (Col 8, Lines 39-48; “programmed system cycle”).
  - o. **Claim 8:** The apparatus defined in claim 7 wherein the arbitration unit grants access to one functional unit if the one functional unit makes a request while the arbitration unit indicates that the one functional unit is at one of the number of rotating slots having a highest priority (Col 8, Lines 42-44).
20. Shibuya, Hill, and Fischer are analogous art because they are from the same field of endeavor of prioritizing bus requests.
21. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Shibuya, Hill, and Fischer before him or her, to modify the arbitration unit policy of Shibuya and Hill to include programmable arbitration schemes as taught by Fischer.
22. A motivation for doing so would have been to improving system performance and perhaps power consumption (Col 5, Lines 19-21).
23. Therefore, it would have been obvious to combine Shibuya and Hill with Fischer to obtain the invention as specified in the instant claims.



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24. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibuya and Hill in view of Yakashiro (US Patent 6,226,702).

25. In **Claim 18**, Shibuya and Hill discloses the limitations of parent Claim 15.

26. In **Claim 18**, Shibuya and Hill does not appear to explicitly disclose an apparatus wherein the arbitration unit dynamically adjusts the priority assigned to each functional unit based on delays in getting requests serviced.

27. However, Yakashiro discloses an apparatus wherein the arbitration unit dynamically adjusts the priority assigned to each functional unit based on delays in getting requests serviced (Col 20, Lines 25 through Col 21, Line 16).

28. Shibuya, Hill, and Yakashiro are analogous art because they are from the same field of endeavor of prioritizing bus requests.

29. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Shibuya, Hill, and Yakashiro before him or her, to modify the arbitration unit policy of Shibuya and Hill to include priority assignments based on delays as taught by Yakashiro.

30. A motivation for doing so would have been to prevent starvation and increasing efficiency of the bus usage (Col 21, Lines 11-16).

31. Therefore, it would have been obvious to combine Shibuya and Hill with Yakashiro to obtain the invention as specified in the instant claims.

***Allowable Subject Matter***

32. **Claims 9, 10, 11, and 13** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

Applicant's remarks submitted 1 June 2007 in response to Office Action mailed on 24 March 2003 have been fully considered below.

Claim 12 Objection

The applicant has amended Claim 12 to address Examiner's Objection. The Examiner agrees that the claim informality has been resolved; therefore, the Objection has been withdrawn.

Claim 1, 19, and 20 Rejections (Shibuya)

The applicant argues that the prior art of record fails to teach Claim 1's "wherein the crossbar comprises an arbitration unit to monitor data traffic generated by each of the plurality of functional units through the crossbar and assigns a priority to each functional unit based on the data traffic, wherein the arbitration unit monitors data traffic from each functional unit by monitoring the type of data that each functional unit transfers". Furthermore, the applicant argues that the prior art of record fails to teach Claim 19 and 20's method and means-for limitations of "monitoring volume of data in data transfers for a plurality of devices ... assigning a priority to each device corresponding to the volume of data in data transfers generated by the device".

The Examiner has considered applicant's remarks; however is not persuaded by them and maintains the rejection of record. The Applicant contends that the Shibuya reference fails to teach Claim 1's "the mapping circuits monitoring the type of data that each functional unit transfers"; the Examiner maintains that this limitation (originally Claim 3) is disclosed by the Hill reference. The Applicant further contends that the Shibuya reference fails to teach Claim 19 and 20's limitation of "monitoring volume of data in data transfers for a plurality of devices and assigning a priority to each device corresponding to the volume of data in data transfers"; the Examiner maintains that Shibuya's "access frequency" is equivalent to applicant's claimed "volume of data".

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC LOONAN whose telephone number is (571)272-6994. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reginald Bragdon can be reached on (571) 272-4204. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eric Loonan/  
Examiner, Art Unit 2189

/Reginald G. Bragdon/  
Supervisory Patent Examiner, Art Unit 2189